1 9 0001

Site:
Break: 1.9
Other:

R-586-7-0-14

4679

FINAL
SCREENING SITE INSPECTION REPORT
FOR
CHEVRON CHEMICALS, INC.
ORLANDO, ORANGE COUNTY, FLORIDA
EPA ID #FLD004064242

Prepared Under
TDD No. F4-8808-22
CONTRACT NO. 68-01-7346

Revision 0

FOR THE

WASTE MANAGEMENT DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

July 2, 1990

NUS CORPORATION
SUPERFUND DIVISION

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NOTICE

The information in this document has been funded wholly by the United States Environmental Protection Agency (EPA) under Contract Number 68-01-7346 and is considered proprietary to the EPA.

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EXECUTIVE SUMMARY

The Chevron Chemical Company facility is located at 3100 Orange Blossom Trail in Orlando, Orange County, Florida. The Chevron Chemical Company operated a blending facility for pesticides and crop sprays from 1950 until 1976. The Central Florida Mack Truck Company utilized the facility for truck service from 1976 to 1987. Two wash ponds were used by Chevron to retain residue generated from the washing of chemical barrels. Use of these ponds was discontinued and eventually excavated upon sale of the property to the truck company. In 1983, Dames & Moore conducted an environmental study at the facility. The results indicated that pesticides, as well as arsenic were present in groundwater samples. Another study performed in 1987 by Jammal & Associates concluded that the shallow aquifer was also contaminated with synthetic and volatile organic compounds.

The former Chevron facility lies in the Atlantic Coastal Plain Physiographic Province in central Florida. The Orlando area lies in the highland region which is an area of karst terrain, characterized by hummocky, undulating topography along with numerous lakes and depressions. The area is underlain mostly by marine limestone, dolomite, shale, sand, and anhydrite to about 6,500 feet below land surface (bls). The underlying limestones and dolomites are divided into four geologic formations: the Hawthorn Group, the Ocala Group, the Avon Park Limestone, and the Lake City Limestone.

The water resources of the Orlando area are directly related to topography. The area is underlain by three aquifers: a surficial aquifer, a shallow artesian aquifer system, and the Floridan aquifer. Groundwater flow is generally to the east. The unconfined, surficial aquifer extends over most of Orange County. The water table for this aquifer ranges from 5 to 10 feet bls. Most wells in this aquifer are 20 to 30 feet deep and yield sufficient water for domestic use (5-10 gpm). The shallow artesian or "shallow rock" aquifer system is found in the upper section of the Hawthorn Group. Aquifers in this system occur locally within the confining beds of the Hawthorn and are usually found at depths ranging from 60 to 150 feet bls. Recharge to the shallow artesian aquifer system is by downward leakage from the surficial aquifer and by upward leakage from the Floridan. The Floridan aquifer is located 150 feet bls and extends down to 2,000 feet bls. The base of potable water in the aquifer is located approximately 1,750 feet bls. The Floridan has two major producing zones that are separated by a relatively impermeable zone. The upper producing zone extends from 150 to approximately 600 feet bls. The lower zone extends from about 1,100 to 1,500 feet bls. There are less permeable layers of clayey sand and lenses of clay between the Floridan and land surface which form a confining layer with a hydraulic conductivity on the order of 1×10^{-5} to 1×10^{-7} cm/sec.

Orlando is an area of recharge for the Floridan aquifer. Recharge is by direct infiltration of rainfall in outcrop areas and by downward leakage from the overlying aquifers. Both sinkholes and drainage wells present in the Orlando area can provide direct routes between these aquifers by breaching the layers of low permeability.

Targets potentially affected include the population associated with both the groundwater and onsite exposure pathways. Contamination in groundwater from both public and private wells is a threat due to the close proximity of these wells to the facility. An estimated 111,377 homes in the Orange County area depend upon groundwater supplies for potable purposes. The presence of contaminated soil also presents a threat due to the dense population surrounding the facility.

The nature of contaminants found during this investigation is consistent with past operations conducted at this facility. Pesticides and petroleum products were present in both soil and groundwater samples. The presence of pesticides and petroleum products in samples collected from locations both on site and downgradient from the operation areas suggest that these contaminants may have begun to migrate off the site.

In summary, the extensive contamination present does pose a threat to area residents associated with the groundwater and onsite exposure pathways. In consideration of groundwater flow direction and sample locations, the laboratory data suggest that contaminants may be migrating offsite. Based on these findings, FIT 4 recommends that Phase I of a Listing Site Inspection be initiated.

1.0 INTRODUCTION

The NUS Corporation Region 4 Field Investigation Team (FIT) was tasked by the United States Environmental Protection Agency (EPA), Waste Management Division to conduct a Screening Site Inspection (SSI) at the Chevron Chemical/Ortho site in Orlando, Orange County, Florida. The inspection will be performed under the authority of the Comprehensive Environmental Response Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Tasks will be performed to satisfy the requirements stated in Phase II of Technical Directive Document (TDD) number F4-8802-22. The field investigation was conducted during the week of June 12, 1989.

1.1 OBJECTIVES

The objectives of this inspection will be to determine the nature of contaminants present at the site and to determine if a release of these substances has occurred or may occur. Further, this inspection will seek to determine the possible pathways by which contamination could migrate from the site and the populations and environments it would potentially affect. Through these objectives, a recommendation will be made regarding future activities at the site.

1.2 SCOPE OF WORK

The objectives were achieved through the completion of a number of specific tasks. These activities were to:

- Obtain and review background materials relevant to HRS scoring of the site
- Obtain information on local water systems
- Evaluate target populations associated with the groundwater, surface water, air and onsite exposure pathways
- Collect a total of 15 environmental samples

2.0 SITE CHARACTERIZATION

2.1 SITE BACKGROUND AND HISTORY

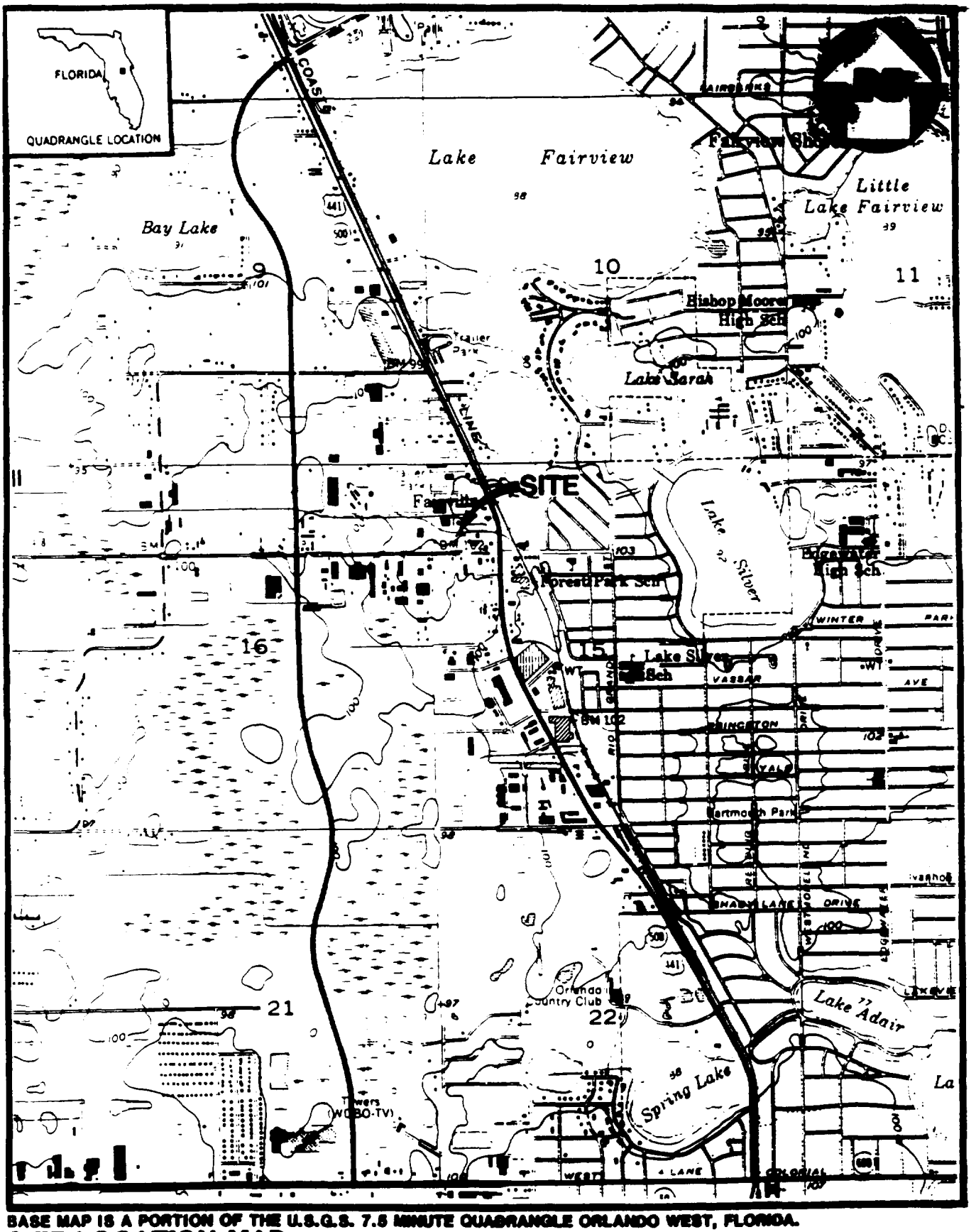
The Chevron Chemical plant formerly occupied the site at 3100 Orange Blossom Trail in Orlando, Orange County, Florida. This plant operated as a chemical blending facility for pesticides and other crop sprays between the years of 1950 and 1976 (Figure 1). The site was operated by the Central Florida Mack Truck Company and utilized as a Mack truck service facility from 1976 until 1987 (Ref. 1). Chevron created two washing ponds to contain the water and residue generated from the washing of chemical barrels. Use of the washing ponds was terminated in 1976 when the facility was sold to Central Florida Mack Truck. The ponds were excavated to a depth of approximately 14 feet below land surface and filled with soil, empty chlordane drums, automobile wreckage, and cement. The truck company proceeded with operations involving waste oil and antifreeze until 1987.

In 1983 Chevron Chemical Company employed the consulting firm of Dames & Moore to conduct a contamination study at the site. The results indicated that pesticides, as well as arsenic were present in groundwater samples exceeding levels set by the state and the U.S. Environmental Protection Agency. In 1987 Central Florida Mack Truck Company employed another consulting firm (Jammal & Associates) to evaluate the contamination at the facility. The report concluded that the shallow aquifer is contaminated with synthetic and volatile organic compounds (Ref. 2). The facility, currently operated as Affordable Storage, rents warehouse space to the public (Ref. 3).

2.2 SITE DESCRIPTION

2.2.1 Site Features

The facility occupies a lot measuring approximately 700 feet by 370 feet and is void of topographic relief. Onsite buildings and structures are located around a large paved asphalt area in the center of the property. These structures include an office, a large metal warehouse, two water storage tanks, and an organic compound volatizer used for evaporation purposes. Two former pesticide washing ponds were filled with debris and have been covered with cement slabs. An abandoned railroad track lies adjacent to the metal warehouse (Figure 2). Access to the facility by the public is not restricted (Ref. 4).

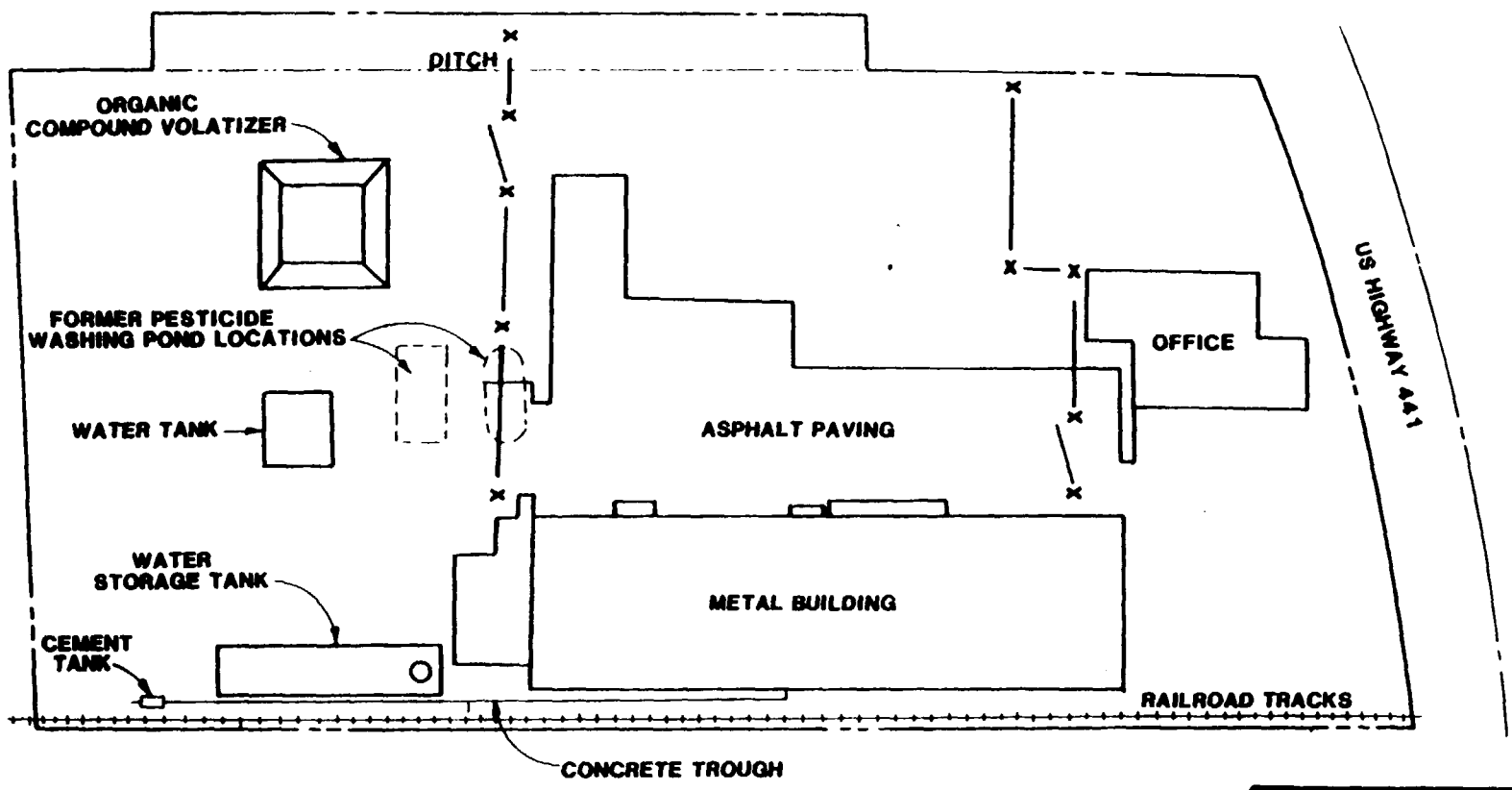


BASE MAP IS A PORTION OF THE U.S.G.S. 7.5 MINUTE QUADRANGLE ORLANDO WEST, FLORIDA.

SITE LOCATION MAP
CHEVRON CHEMICAL / ORTHO
ORLANDO, ORANGE COUNTY, FLORIDA

FIGURE 1

NUS CORPORATION



SITE LAYOUT MAP
CHEVRON CHEMICAL / ORTHO
ORLANDO, ORANGE COUNTY, FLORIDA

FIGURE 2

NUS CORPORATION

2.2.2 Waste Characteristics

Past operations by Chevron were restricted to blending pesticides and crop sprays of which the exact composition and concentrations are unknown. Wash residue from the chemical drums used during this process was placed in two unlined ponds approximately 20 feet by 60 feet in length and 3 feet in depth. The use of these ponds was terminated in 1976 (Ref. 2).

Central Florida Mack Truck Company was involved in truck maintenance and produced waste which included antifreeze and waste oil. The exact quantities and disposal methods are unknown; however, some of this waste was apparently dumped directly onto the grounds at the facility (Ref. 2).

3.0 REGIONAL POPULATIONS AND ENVIRONMENTS

3.1 POPULATION AND LAND USE

3.1.1 Demography

The population within a 1-mile radius of the facility predominantly resides in an urban area (approximate population: 3,582 people) located 0.25 mile to the southeast across U.S. Highway 441 (Ref. 5). The Silver Star Vocational School is 0.25 mile east of the site on Silver Star Boulevard (Ref. 6). An estimated 46,060 residents live within a 4-mile radius of the facility (Ref. 5).

3.1.2 Land Use

Land to the west is used primarily for industrial purposes, while the area east of U.S. Highway 441 is comprised of single-family housing units. Two trailer parks, one of which is adjacent to the site, are located to the north. Four schools and a recreational area (Dartmouth Park) reside within the 1-mile radius (Ref. 6). There is no known agricultural use of land or land-related sensitive environments within 4 miles of the facility (Refs. 6, 7)

3.2 SURFACE WATER

3.2.1 Climatology

The region experiences a subtropical climate with average temperatures ranging from 61° to 82° F during the months of January and August, respectively. Average annual net precipitation is 22 inches with the greatest rainfall occurring during the months of February through May, and the driest period occurring during the months of September and October (Ref. 8).

3.2.2 Overland Drainage

Surface water runoff from the site drains southwest across the abandoned railroad track to property occupied by North Bros. Insulation Company. Low-lying areas here commonly flood during periods of heavy rain. The insulation company has, in the past, complained of oily debris in surface water flowing from the Chevron facility (Ref. 4). The lack of topographic relief restricts the surface water

runoff from migrating past the immediate site vicinity and adjacent properties. This water would eventually percolate into the ground around the facility (Ref. 6).

3.2.3 Potentially Affected Water Bodies

Due to restricted overland drainage, the potential for contaminant migration to surrounding water bodies poses an unlikely threat (Ref. 6).

3.3 GROUNDWATER

3.3.1 Hydrogeology

The former Chevron/Ortho facility lies in the Atlantic Coastal Plain Physiographic Province in central Florida. The area of Orange County is subdivided into three topographic regions: 1) low-lying regions where altitudes are generally less than 35 feet, 2) intermediate regions with altitudes between 35 and 100 feet, and 3) highland regions with altitudes generally greater than 105 feet (Ref. 9, p. 7). The Orlando area lies in the highland region, which is an area of karst terrain, characterized by hummocky, undulating topography and numerous lakes and depressions but few surface streams (Refs. 9, p. 9; 10, p. 14).

The area is underlain mostly by marine limestone, dolomite, shale, sand, and anhydrite to about 6,500 feet below land surface (bls) (Ref. 9, p. 14). The youngest sediments in the area are Recent to Pliocene age undifferentiated deposits of sand with varying amounts of clay and shell and with an average thickness of 40 feet (Ref. 9, p. 82). The underlying limestones and dolomites are divided into four geologic formations: the Hawthorn Group, the Ocala Group, the Avon Park Limestone, and the Lake City Limestone (Figure 3).

The Miocene age Hawthorn Group extends from approximately 40 to 130 feet bls and is composed of thick, sandy clays and limestone layers (Ref. 9, p. 16). The fine, granular limestone of the Ocala Group unconformably underlies the Hawthorn and is approximately 125 feet thick (Ref. 9, p. 20). The underlying Avon Park and Lake City limestones consist of alternating layers of hard, crystalline dolomite and fossiliferous limestone. Only few wells penetrate into these Eocene-age formations, and the contact between them is indistinct, but the Avon Park Limestone is estimated between 400 and 600 feet thick, and the Lake City Limestone is considered to be over 700 feet thick (Ref. 9, p. 18).

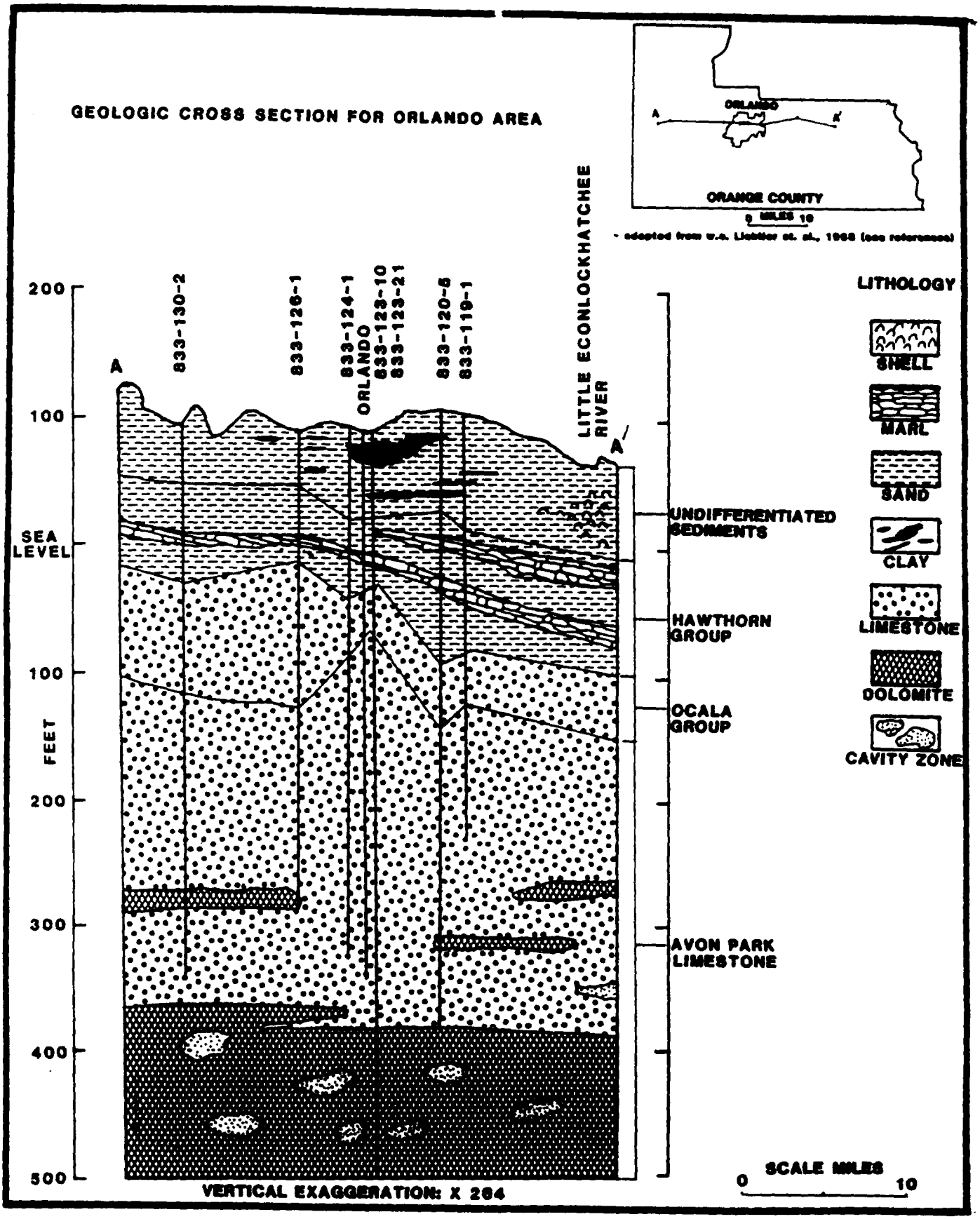

GEOLOGIC CROSS SECTION FOR ORLANDO AREA
ORLANDO
A
A'
ORANGE COUNTY
0 MILES 10
- adapted from W.H. Lichtler et. al., 1968 (see references)
LITHOLOGY
SHELL
MARL
SAND
CLAY
LIMESTONE
DOLOMITE
CAVITY ZONE
833-130-2
833-126-1
833-124-1
ORLANDO
833-123-10
833-123-21
833-120-5
833-119-1
LITTLE ECONLOCKHATCHEE RIVER
UNDIFFERENTIATED SEDIMENTS
HAWTHORN GROUP
OCALA GROUP
AVON PARK LIMESTONE
SEA LEVEL
FEET
200
100
100
200
300
400
500
VERTICAL EXAGGERATION: X 264
SCALE MILES
0
10

FIGURE 3

The water resources of the Orlando area are directly related to topography (Ref. 9, p. 9). The area is underlain by three aquifers: a surficial aquifer, a shallow artesian aquifer system, and the Floridan aquifer. Groundwater flow is generally to the east (Ref. 9, pp. 104, 106).

The unconfined, surficial aquifer, located in the undifferentiated Recent to Pliocene deposits, extends over most of Orange County. The water table for this aquifer ranges from 5 to 10 feet bls (Ref. 2, p. 92). Most wells in this aquifer are 20 to 30 feet deep and yield sufficient water for domestic use (5-10 gpm) (Ref. 9, p. 83).

The shallow artesian or "shallow rock" aquifer system is found in the upper section of the Hawthorn Group and consists of discontinuous shell beds, sand and gravel zones, and thin limestone lenses (Ref. 9, p. 88). Aquifers in this system occur locally within the confining beds of the Hawthorn and are usually found at depths ranging from 60 to 150 feet bls (Ref. 9, p. 88). Recharge to the shallow artesian aquifer system is by downward leakage from the surficial aquifer and by upward leakage from the Floridan (Ref. 9, p. 90).

The Floridan aquifer is the primary aquifer in this area, supplying most of Florida with fresh water. The top of the Floridan aquifer is located 150 feet bls and extends down to 2,000 feet bls (Ref. 9, p. 91). The base of potable water in the aquifer is located approximately 1,750 feet bls (Ref. 9, p. 124). The Floridan is composed of a continuous sequence of limestone and dolomite and has two major producing zones that are separated by a relatively impermeable zone. The upper producing zone extends from 150 to approximately 600 feet bls. The lower zone extends from about 1,100 to 1,500 feet bls (Ref. 9, p. 94). There are less permeable layers of clayey sand and lenses of clay between the Floridan and land surface which form a confining layer with a hydraulic conductivity on the order of 1×10^{-5} to 1×10^{-7} cm/sec for unconsolidated deposits of this type (Ref. 11, p. 29).

Orlando is an area of recharge for the Floridan aquifer. Recharge is by direct infiltration of rainfall in outcrop areas and by downward leakage from the overlying aquifers. Also, there are more than 300 drainage wells in the county that artificially recharge the aquifer (Ref. 9, p. 112). Net annual precipitation for this area is 7 inches, and the 1-year, 24-hour rainfall is 4 inches (Refs. 8, pp. 43, 63; 12, p. 93).

Infiltration of water from overlying aquifers provides a route for contaminants to enter the aquifers. Sinkholes, which are common in Orlando, can provide more direct routes for contaminant transport, by breaching the layers of low permeability (Ref. 9, p. 13). Approximately six sinkholes are located within a 2-mile radius of the facility (Ref. 13). Due to the lack of a significant number of surface

streams, most surface drainage flows into sinkholes and other closed depressions. Drainage wells also provide a direct route for contamination into the Floridan aquifer (Ref. 9, p. 128).

3.3.2 Aquifer Use

Sinkholes in the area can result in a direct route for contaminant transport to the three underlying aquifers; therefore, the entire population utilizing these aquifers is considered to be at risk (Ref. 13). All area residents in Orange County are dependent upon groundwater as a sole source for potable water. Two municipal systems operate wells located within a 4-mile radius. The Orlando Utilities Commission Water Department has three wells located 2.2 miles southeast at the intersection of Highland Drive and Orange Avenue. Water from these wells (approximate depth of 1,320 feet) is combined into their system for distribution to 89,000 homes in Orlando and surrounding counties (Ref. 14).

The Winter Park Utilities Water Department has two wells located 2.2 miles to the northeast at the intersection of Wymore Road and Lee Road. Water from these wells (approximate depth of 1,200 feet) is also combined with water from other wells for distribution to 21,000 homes in the Orlando area (Ref. 15).

Private wells do exist despite the extensive municipal water systems present within the 4-mile radius. An exact count of these private wells was not available; however, it is estimated that approximately 10 percent of the area residents within this radius use private wells (Ref. 16). This would result in approximately 1,377 area homes dependent upon private wells for potable water. This figure is 10 percent of the population as estimated by 1980 census data. The actual population count may be greater or less than the value shown. The nearest well (based on GEMS) is located 2,700 feet from the facility (Ref. 5).

3.4 SUMMARY OF POTENTIALLY AFFECTED POPULATIONS AND ENVIRONMENTS

Pathways of concern would include both groundwater and onsite exposure pathways. Surface water pathway potential for contaminant release is not a concern based on the restricted migration pathway. Groundwater is the primary pathway of concern due to the close proximity of the municipal and private wells to the facility. Groundwater from these wells supplies an estimated 111,377 homes in the Orange County area. Both air and onsite exposure pathways are a concern due to the presence of contaminated soils. Approximately 3,582 people are located within a 1-mile radius of the site.

4.0 FIELD INVESTIGATION

4.1 FIELD ANALYTICAL SCREENING PROGRAM

FIT 4 Field Analytical Support Project (FASP) was used in conjunction with other considerations, such as file material and site observations, to aid in determining sample locations. Soil gas probes were analyzed with both the OVA and HNu. Readings above background in one specific area alerted the project manager to a previously unidentified area of contamination. The decision was made to collect an additional CLP sample from this suspected contaminated area (Ref. 17).

Initially FASP installed 39 soil gas probes at 40-foot intervals and designated them into five separate groups, specifically the A, B, C, D, and RR group series (Figure 4). All of the D series probes registered organic vapor readings on both instruments. The decision was then made by the project manager to relocate CLP samples (CC-SB-05 and CC-TW-05) to this area. Readings of at least 1000 ppm on the OVA from probes 2B, 3B, 2C, and 3C alerted the project manager to a previously unidentified area of contamination. The proposed location for samples CC-SB-06 and CC-TW-06 were relocated to this suspected contaminated area. The RR series produced high OVA readings; however, the readings on the HNu were considerably lower (Ref. 17).

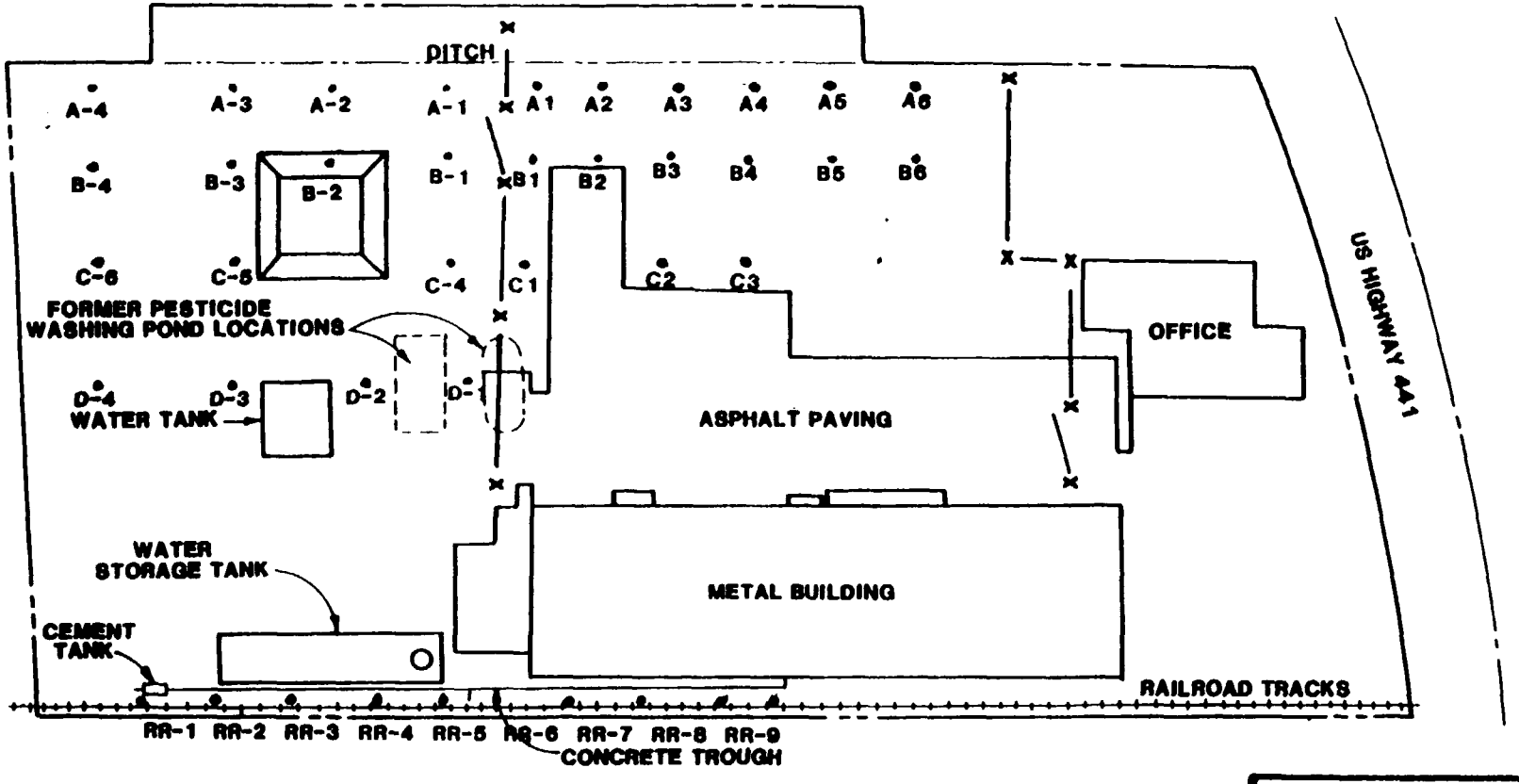
4.2 SAMPLE COLLECTION

4.2.1 Sample Collection Methodology

All sample collection, sample preservation, and chain-of-custody procedures used during this investigation were in accordance with standard operating procedures as specified in Sections 3 and 4 of the Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual; United States Environmental Protection Agency, Region IV, Environmental Services Division (ESD), April 1, 1986.

4.2.2 Split Samples

Split samples were offered to North Bros. Insulation but were declined by Mr. John Dionne. Chevron representatives were not present during this inspection; therefore, no split samples were offered.



SOIL GAS PROBES
CHEVRON CHEMICAL / ORTHO
ORLANDO, ORANGE COUNTY, FLORIDA

FIGURE 4

NUS CORPORATION

4.2.3 Description of Samples and Sample Locations

The surface soil, subsurface soil, and groundwater samples from locations CC-SS-01, CC-SB-01, and CC-TW-01 were collected 85 feet southwest of the facility as upgradient background samples. Eight onsite samples consisting of surface soil, subsurface soil, and groundwater were collected from areas associated with the potential for waste discharge. Four samples, consisting of subsurface soil and groundwater, were collected downgradient from the abovementioned areas to evaluate contaminant migration. All CLP sample locations are shown in Figure 5 and described in Table 1.

4.2.4 Field Measurements

Field measurements on the water samples collected during this investigation consisted of temperature, pH, and conductivity. This data is listed in Table 1.

4.3 SAMPLE ANALYSIS

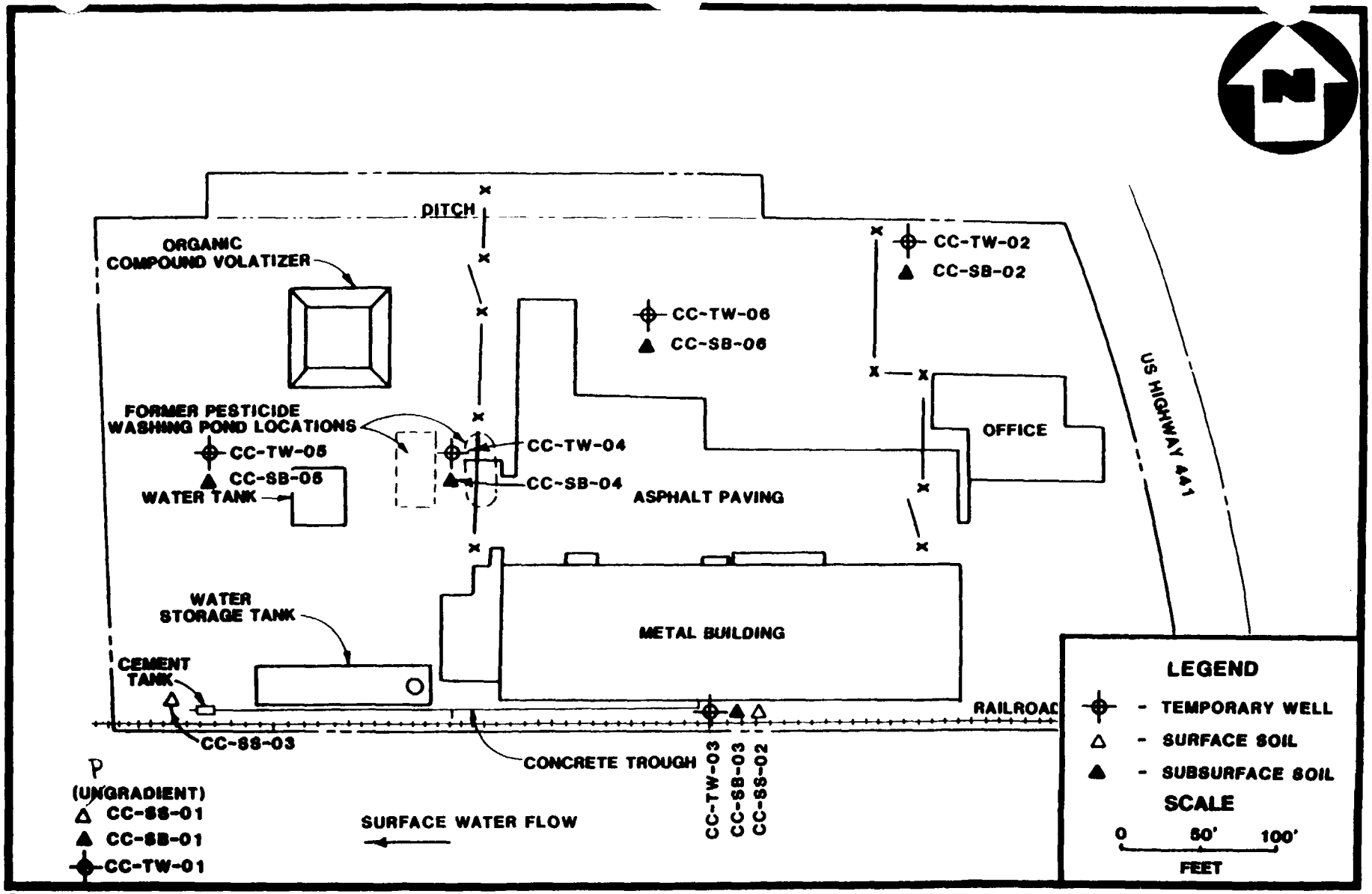
4.3.1 Analytical Support and Methodology

All samples collected were analyzed under the Contract Laboratory Program (CLP) and analyzed for all parameters listed in the Target Compound List (TCL). Organic analysis of soil and water samples was performed by Gulf South Environmental Labs in New Orleans, Louisiana. Inorganic analysis of soil and water was performed by Laucks Testing Labs, Inc. in Seattle, Washington.

All laboratory analyses and laboratory quality assurance procedures used during this investigation were in accordance with standard procedures and protocols as specified in the Analytical Support Branch Operations and Quality Assurance Manual, United States Environmental Protection Agency, Region IV, Environmental Services Division, revised June 1, 1985; or as specified by the existing United States Environmental Protection Agency standard procedures and protocols for the contract analytical laboratory program.

4.3.2 Analytical Data Quality

All analytical data were subjected to a quality assurance review as described in the EPA Environmental Services Division laboratory data evaluation guidelines. As shown in the tables, some of the organic and inorganic parameters were assigned estimated concentrations as indicated with the letter "J". This indicates that the qualitative analysis was acceptable, but the reported concentration should not be considered accurate. A few other compounds were noted as being



SAMPLE LOCATION MAP
CHEVRON CHEMICAL / ORTHO
ORLANDO, ORANGE COUNTY, FLORIDA

FIGURE 5

NUS CORPORATION

TABLE 1

SAMPLE CODES, DESCRIPTIONS, AND FIELD MEASUREMENTS
CHEVRON CHEMICALS, INC.
ORLANDO, ORANGE COUNTY, FLORIDA

Sample Code	Description	Collection Date	Collection Time	pH	Conductivity (umhos/cm)	Temp. (°C)
CC-SS-01	Background surface soil sample taken 300 feet southwest of the metal building	6/13/89	0766	N/A	N/A	N/A
CC-SS-02	Onsite surface soil sample taken from discharge area south of the metal building	6/13/89	1110	N/A	N/A	N/A
CC-SS-03	Onsite surface soil sample taken from area surrounding cement tank	6/13/89	1140	N/A	N/A	N/A
CC-SB-01	Background subsurface soil sample taken at same location as CC-SS-01	6/13/89	0810	N/A	N/A	N/A
CC-SB-02	Downgradient subsurface soil sample taken from area 200 feet northeast of the metal building	6/14/89	1205	N/A	N/A	N/A
CC-SB-03	Onsite subsurface soil sample taken at same location as CC-SS-02	6/14/89	0930	N/A	N/A	N/A
CC-SB-04	Onsite subsurface soil sample taken at area between former washing ponds	6/13/89	1330	N/A	N/A	N/A
CC-SB-05	Onsite subsurface soil sample taken 75' west of water tank	6/13/89	1535	N/A	N/A	N/A
CC-SB-06	Downgradient subsurface soil sample taken 175' north of the metal building	6/13/89	1000	N/A	N/A	N/A
CC-TW-01	Background groundwater sample taken at same location as CC-SB-01	6/13/89	0835	5 9	162	28

TABLE 1

SAMPLE CODES, DESCRIPTIONS, AND FIELD MEASUREMENTS
CHEVRON CHEMICALS, INC.
ORLANDO, ORANGE COUNTY, FLORIDA

Sample Code	Description	Collection Date	Collection Time	pH	Conductivity (umhos/cm)	Temp. (°C)
CC-TW-02	Downgradient groundwater sample taken at same location as CC-SB-02	6/14/89	1235	6 2	533	27
CC-TW-03	Onsite groundwater sample taken at same location as CC-SB-03	6/14/89	1025	6 4	863	29
CC-TW-04	Onsite groundwater sample taken at same location as CC-SB-04	6/13/89	1445	6 1	3380	30
CC-TW-05	Onsite groundwater sample taken at same location as CC-SB-05	6/13/89	1600	5 6	82	29
CC-TW-06	Downgradient groundwater sample taken at same location as CC-SB-06	6/13/89	1120	8 2	1610	28

detected based on the presumptive evidence of their presence as indicated by the letter "N". This means that the compound was tentatively identified, and its detection cannot be used as a positive identification as to its presence. The complete analytical data sheets are provided in Appendix C.

4.3.3 Presentation of Analytical Results

All the surface soil samples collected at suspected onsite source areas contained the pesticides gamma-BHC, DDE, DDD, endrin, gamma-chlordane, and alpha-chlordane at levels significantly above the background samples. The pesticide product 4,4-DDD was present at the greatest concentration in surface soil sample CC-SS-02 (located at the suspected discharge area) at 820,000 ug/kg. Petroleum solvents were also detected in these samples at significant concentrations. The subsurface soil samples collected in the same locations as the surface soil samples contained similar pesticides and petroleum solvents as the surface soil samples.

Sample CC-SB-04, collected near the former wash pond, contained xylene at a concentration of 1 percent. In contrast, the background sample collected from the adjacent property to the southwest contained no organic constituents in excess of detection limits. Sample CC-SS-03, located near the cement tank, contained several polyaromatic hydrocarbons commonly found in creosol which may be attributable to the adjacent railroad ties. Inorganic analysis of the onsite samples revealed similar concentrations as compared to the background sample. The few parameters which did exceed 3 to 5 times the background levels cannot readily be attributed to past site operations. These parameters would include aluminum, barium, copper, iron, sodium, and zinc. The analytical data for the soil samples is presented in Tables 2 and 3.

Groundwater samples were contaminated with a greater variety of petroleum products (much more so than the soil samples) and pesticides. The pesticide chlordane and the petroleum product xylene were present in the greatest concentrations in sample CC-TW-04 at 390 ug/l and 18,000 ug/l, respectively. This sample was collected adjacent to the former wash ponds. Several samples exhibited inorganic parameters which were in excess of 3 to 5 times the levels found in the background sample. However, the past operating history does not provide any suggestions as to their elevated levels at the facility. The analytical data is presented in Tables 4 and 5.

4.4 SUMMARY OF FIELD INVESTIGATION

The decision to relocate samples CC-SB-05, CC-TW-05, CC-SB-06, and CC-TW-06 proved to be beneficial. The laboratory analysis of the CLP samples confirmed the presence of volatiles as indicated during the FASP screening procedure.

TABLE 2

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
CHEVRON CHEMICAL/ORTHO
ORLANDO, FLORIDA

	Background		Onsite						
PARAMETERS (ug/kg)	CC-SS-01	CC-SB-01	CC-SS-02	CC-SS-03	CC-SB-02	CC-SB-03	CC-SB-04	CC-SB-05	CC-SB-06
PURGEABLE COMPOUNDS									
TOLUENE	-	-	12,000J		210	-	-	-	-
CHLOROBENZENE	-	-			22			-	-
ETHYL BENZENE	-	-	-		17	28,000	-	-	1000
TOTAL XYLENES	-	-	300,000		28	270,000	1,000,000	78	5200
EXTRACTABLE COMPOUNDS									
1,4 DICHLOROBENZENE	-		-				12,000J		510
1,2 DICHLOROBENZENE	-	-							220J
(3-AND/OR 4-)METHYLPHENOL	-		-	240J		-		-	-
1,2,4-TRICHLOROBENZENE	-		-				-	-	790
NAPHTHALENE	-		5900J			13,000J	35,000		430
2-METHYLNAPHTHALENE	-		8200J			30,000J	85,000J	-	3200J
FLUORENE	-		-			-	-	-	190J
PHENANTHRENE	-	-		270J				-	570
ANTHRACENE	-	-	-	51J		-	-	-	-
FLUORANTHENE	150J		-	180J			-	-	-
PYRENE	120J	-		250J			-	-	-
BENZO(A)ANTHRACENE	-	-	-	130J	-		-	-	-

- Material analyzed for but not detected above minimum quantitation limit
J Estimated value
N Presumptive evidence of presence of material
C Confirmed by GCMS

TABLE 2

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
CHEVRON CHEMICAL/ORTHO
ORLANDO, FLORIDA

	Background		Onsite						
PARAMETERS (ug/kg)	**CC-SS-01**	**CC-SB-01**	**CC-SS-02**	**CC-SS-03**	**CC-SB-02**	**CC-SB-03**	**CC-SB-04**	**CC-SB-05**	**CC-SB-06**
CHRYSENE				180J					200J
BENZO(B AND/OR K)FLUORANTHENE	-	-		370J				-	-
ETHYLMETHYLBENZENE	-		40,000JN		-	40,000JN		100JN	-
TRIMETHYLBENZENE	-		40,000JN	-	200JN	70,000JN	100,000JN	300JN	-
CHORDENE	-		20,000JN	-					-
DDMU	-		50,000JN					-	-
NONACHLOR	-		70,000JN				600,000JN	200JN	-
METHYL(METHYLETHYL)PHENANTHRENE	-				400JN			-	-
ETHION	-					90,000JN	300,000JN	-	3000JN
CARBOPHENOTHION	-		-			-	80,000JN	-	800JN
DIMETHYLNAPHTHALENE	-		-	-				100JN	-
ASPON			-					500JN	-
TETRAMETHYLBUTYLPHENOL							-		800JN
TETRAHYDROISOINDOLEDIONE	-		-	-				-	-
UNIDENTIFIED COMPOUNDS/NO	2000J/2	-	400,000J/12	500J/1	600J/1	900,000J/16	2,000,000/14	-	30,000J/18
PESTICIDE\PCB COMPOUNDS									
ALPHA-BHC	-	-	25,000	-	24C	3300J	23,000C	-	-
BETA-BHC	-	-	-	31	14		4400J	-	230

- Material analyzed for but not detected above minimum quantitation limit
J Estimated value
N Presumptive evidence of presence of material
C Confirmed by GCMS

TABLE 2

SUMMARY OF ORGANIC ANALYTICAL RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
CHEVRON CHEMICAL/ORTHO
ORLANDO, FLORIDA

PARAMETERS (ug/kg)	Background		Onsite						
	CC-SS-01	CC-SB-01	CC-SS-02	CC-SS-03	CC-SB-02	CC-SB-03	CC-SB-04	CC-SB-05	CC-SB-06
DELTA-BHC	-	-	-	-	51C	-	-	-	-
GAMMA-BHC (LINDANE)	-	-	-	-	-	4800J	85,000C	-	-
HEPTACHLOR	-	-	-	-	-	18,000C	66,000C	190	-
ALDRIN	-	-	-	-	-	14,000J	-	-	940JN
HEPTACHLOR EPOXIDE	-	-	-	310	-	-	-	-	-
DIELDRIN	-	-	-	300JN	-	-	72,000J	96J	2000J
4,4' DDE (P,P'-DDE)	-	-	320,000C	500J	-	-	71,000J	-	4100J
ENDRIN	-	-	130,000	-	-	-	-	-	-
ENDOSULFAN II (BETA)	-	-	-	87	-	-	-	-	-
4,4'-DDD (P,P'-DDD)	-	-	820,000C	270JN	-	150,000C	350,000C	93J	8400J
4,4'-DDT (P,P'-DDT)	-	-	230,000J	67J	-	74,000J	170,000JC	65J	-
GAMMA-CHLORDANE /2	-	-	240,000C	3900C	-	45,000JC	200,000C	1000C	6700C
ALPHA-CHLORDANE /2	-	-	480,000C	2500C	-	76,000JC	220,000C	690JC	5800C

- Material analyzed for but not detected above minimum quantitation limit
J Estimated value
N Presumptive evidence of presence of material
C Confirmed by GCMS

TABLE 3

SUMMARY OF INORGANIC ANALYTICAL RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
CHEVRON CHEMICAL/ORTHO
ORLANDO, FLORIDA

PARAMETERS (mg/kg)	Background		Onsite						
	CC-SS-01	CC-SB-01	CC-SS-02	CC-SS-03	CC-SB-02	CC-SB-03	CC-SB-04	CC-SB-05	CC-SB-06
ALUMINUM	2200J	12,000J	2700J	4600J	18,000J	21,000J	13,000J	16,000J	18,000J
ARSENIC	-		2 5	7 2	-	1 7	2 2		-
BARIUM	6 9	16	34	42	93	8 9	18	18	28
CADMIUM	-		-	2 2J	-		-		
CALCIUM	200,000J	1100J	2200J	19,000J	800J	440J	480J	250J	3000J
CHROMIUM	9 1J	11J	13J	11J	11J	16J	13J	9 4J	13J
COBALT	-	-		-	2 8J		-	-	4 8J
COPPER	7 1	-	85	47		7	-		3 8
IRON	1200J	310J	2100J	7500J	1200J	550J	390J	320J	650J
LEAD	75	4 3	110	140	10	17	19	25	13
MAGNESIUM	1500			520					-
MANGANESE	28J	-	36J	46J	2 8J	11J	3 6J	1 6J	3 1J
MERCURY	-	-		-	-		-	0 19	0 28
POTASSIUM	-	-		-	500	710		-	690
SODIUM	98	-	370	-	71	660	57	-	570
VANADIUM	6 9	-	5 7	6 4	6		-		-
ZINC	62	-	260	110	5 3	42	-	4	15

- Material analyzed for but not detected above minimum quantitation limit
J Estimated value

TABLE 4

SUMMARY OF ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
CHEVRON CHEMICAL/ORTHO
ORLANDO, FLORIDA

PARAMETERS (ug/l)	Background	Onsite				
	CC-TW-01	CC-TW-02	CC-TW-03	CC-TW-04	CC-TW-05	CC-TW-06
PURGEABLE COMPOUNDS						
CARBON DISULFIDE	-	58J			-	-
1,1-DICHLOROETHENE	-	-			-	44J
1,2-DICHLOROETHANE	-	-			-	35J
1,2-DICHLOROPROPANE	-	4J			-	23J
1,1,2-TRICHLOROETHANE	-	-		430	-	62
BENZENE	-	29		-	-	-
TOLUENE	-	-	730N	-	-	-
CHLOROBENZENE	-	150	140	-	-	180
ETHYL BENZENE	-	220	720	3600	4J	600
TOTAL XYLENES	-	550J	4400	18,000	170	2900
EXTRACTABLE COMPOUNDS						
1,4-DICHLOROBENZENE	-	12	-	55	-	56
1,2-DICHLOROBENZENE	-	-	-	-	-	18
2-METHYLPHENOL	-	-	23	-	-	-
(3-AND/OR 4-)METHYLPHENOL	-	-	32	260	-	56
ISOPHORONE	-	-	20	750	-	-
1,2,4-TRICHLOROBENZENE	-	-	-	-	-	21

- Material analyzed for but not detected above minimum quantitation limit
J Estimated value
N Presumptive evidence of presence of material

TABLE 4

SUMMARY OF ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
CHEVRON CHEMICAL/ORTHO
ORLANDO, FLORIDA

PARAMETERS (ug/l)	Background	Onsite				
	CC-TW-01	CC-TW-02	CC-TW-03	CC-TW-04	CC-TW-05	CC-TW-06
NAPHTHALENE		13	100	190	9J	63
2-METHYLNAPHTHALENE		10	56	200	11	75
2,4,5-TRICHLOROPHENOL	-		23J		-	-
ETHYLMETHYLBENZENE		200JN	900JN/2	1000JN	200JN/2	100JN/2
TRIMETHYLBENZENE	-	1000JN/3	2000JN/3	2000JN/3	400JN/3	100JN/2
TETRAMETHYLBENZENE	-	-	-	-	-	30JN
ETHION		-	-	2000JN	-	100JN
CARBOPHENOTHION		-		600JN	-	50JN
DIMETHYLNAPHTHALENE		-	-		-	60JN
TETRAMETHYLBUTYLPHENOL		10JN			-	-
PROMETON	10JN	-	-		-	-
PROPYLBENZENE		40JN	-		-	-
DIHYDROINDENE		70JN	200JN		20JN	-
METHYLEHTOXYPHENOL METHYLCARBAMATE	-	300JN	-			-
DIMETHYLBENZALDEHYDE	-	20JN	-		-	-
DIMETHYLETHYLPHENOL	-	20JN			-	-
DIMETHYLBENZOIC ACID		10JN	-		-	-
DIMETHYLETHYLPHENOXY PROPANOL	-	200JN	-		-	-

- Material analyzed for but not detected above minimum quantitation limit
J Estimated value
N Presumptive evidence of presence of material

TABLE 4

SUMMARY OF ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
CHEVRON CHEMICAL/ORTHO
ORLANDO, FLORIDA

PARAMETERS (ug/l)	Background	Onsite				
	CC-TW-01	CC-TW-02	CC-TW-03	CC-TW 04	CC-TW-05	CC-TW-06
METHYLPROPYLBENZENE	-	-	30JN	-	20JN	-
ETHYLDIMETHYLBENZENE	-	-	50JN	-	9JN	-
PHENYLETHANONE	-	-	50JN	-	-	-
DIMETHYLPHENOL	-	-	40JN	-	-	-
ETHYLMETHYLPHENOL	-	-	30JN	-	-	-
DIHYDROINDENONE	-	30JN	200JN	-	-	-
1-METHYLNAPHTHALENE	-	-	50JN	-	-	20JN
DIETHYLDISULFIDE	-	-	-	600JN	-	-
TETRAHYDROISOINDOLEDIONE	-	-	-	10,000JN	-	50JN
UNIDENTIFIED COMPOUNDS/NO	-	-	500J/7	-	-	500J/9
PESTICIDE\PCB COMPOUNDS						
ALPHA-BHC	-	17	3 6	35	-	-
BETA-BHC	-	5 5	-	-	-	5 9
DELTA-BHC	-	20	5 7	-	0 92	2 1
GAMMA-BHC (LINDANE)	-	1 2	-	-	0 79	1
HEPTACHLOR	-	1 1	-	98	0 59	-
ALDRIN	-	3 1	-	22	-	-
HEPTACHLOR EPOXIDE	-	-	5 7	30	0 58	-

- Material analyzed for but not detected above minimum quantitation limit
J Estimated value
N Presumptive evidence of presence of material

TABLE 4

SUMMARY OF ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
CHEVRON CHEMICAL/ORTHO
ORLANDO, FLORIDA

PARAMETERS (ug/l)	Background	Onsite				
	CC-TW-01	CC-TW-02	CC-TW-03	CC-TW-04	CC-TW-05	CC-TW-06
DIELDRIN		-	-	72	0 93	-
4,4'-DDE (P,P'-DDE)	-	1 3		52		-
ENDRIN	-		-	140	0 87	-
ENDOSULFAN II (BETA)		0 51	-	-		
4,4'-DDD (P,P'-DDD)		-	5 4		1 3	
4,4'-DDT (P,P'-DDT)	-	-	-	140	-	
GAMMA-CHLORDANE /2		3 1		530	2 8	1 2
ALPHA-CHLORDANE /2		-		390	2 2	2 6

- Material analyzed for but not detected above minimum quantitation limit
J Estimated value
N Presumptive evidence of presence of material

TABLE 5

SUMMARY OF INORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLES
CHEVRON CHEMICAL COMPANY
ORLANDO, FLORIDA

PARAMETERS (ug/l)	Background	Onsite				
	CC-TW-01	CC-TW-02	CC-TW-03	CC-TW-04	CC-TW-05	CC-TW-06
ALUMINUM	56,000	190,000	90,000	15,000	39,000	150,000
ARSENIC	-	12J	11UJ	32UJ	-	81J
BARIUM	130	880	-		32	710
CALCIUM	25,000	54,000	4200	45,000	5400	8700
CHROMIUM	39	130	110	82	28	120
COBALT		15	16	20	-	-
COPPER	10	110	32		63	55
IRON	2200	9600	4700	7500	670	9300
LEAD	6J	9J	37J	60J	41J	10J
MAGNESIUM	-	7800		11,000	-	2900
MANGANESE	5	64	85	250	15	39
MERCURY	0.60J	0.71J	0.60J	-		-
POTASSIUM		21,000	120,000	350,000	8600	84,000
SODIUM	4600	46,000	80,000	150,000	3700	170,000
VANADIUM	15	140	-	110	-	180
ZINC	-		490	39	25	320

- Material analyzed for but not detected above minimum quantitation limit
J Estimated value

The analytical data presented is consistent with the general historical information regarding the former pesticide blending operation and the truck servicing facility. Although no information is available regarding specific pesticides and/or petroleum products used at the facility, the nature of the contaminants found would be compatible with these types of operations. Pesticides and petroleum products found in the groundwater samples were also present in soil samples. Based on past disposal practices, it is conceivable that contaminant migration may have occurred through multiple media. Specifically, the downward filtration of water through the contaminated soil may be responsible for transporting contaminants to the underlying aquifers. In consideration of groundwater flow direction, the presence of these contaminants in downgradient samples (CC-TW-02 and CC-TW-06) suggests that they may have begun to migrate offsite.

On August 22, 1989, FIT 4 requested Emergency Removal Action be considered at this facility based upon the high concentrations of contaminants discovered during this investigation. Factors supporting this decision included contaminated soils located outside of the fenced portion of the facility, common flooding of this contaminated soil, and use of the facility for public storage space (Ref. 3).

5.0 SUMMARY

In summary, the potentially affected targets would be the population at risk for onsite exposure (3582 people) and those residents connected to the Orlando Utilities water service (342,326 people). The significant findings of the field investigation indicate that the surface soil, subsurface soil, and groundwater are contaminated with pesticides and petroleum products. In consideration of the groundwater flow direction and sample locations, the analytical data suggests that contaminants may be migrating offsite. Based on these findings, FIT 4 recommends that Phase I of a Listing Site Inspection be initiated

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